

## **APPENDICES**

## **APPENDIX A**

### **Acronyms, Abbreviations, Symbols, and Notation**

## Appendix A

### Acronyms, Abbreviations, Symbols, and Notation

#### A.1.0 Acronyms And Abbreviations

AA	Atomic absorption
ASCII	American Standard Code for Information Interchange
ASTM	American Society for Testing and Materials
CCM	Constant capacitance (adsorption) model
CDTA	Trans-1,2-diaminocyclohexane tetra-acetic acid
CEAM	Center for Exposure Assessment Modeling at EPA's Environmental Research Laboratory in Athens, Georgia
CEC	Cation exchange capacity
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
DLM	Diffuse (double) layer (adsorption) model
DDLM	Diffuse double layer (adsorption) model
DOE	U.S. Department of Energy
DTPA	Diethylenetriaminepentacetic acid
EDTA	Ethylenediaminetriacetic acid
EDX	Energy dispersive x-ray analysis
EPA	U.S. Environmental Protection Agency
EPRI	Electric Power Research Institute
HEDTA	N-(2-hydroxyethyl) ethylenedinitrilotriacetic acid
HLW	High level radioactive waste
IAEA	International Atomic Energy Agency
ICP	Inductively coupled plasma
ICP/MS	Inductively coupled plasma/mass spectroscopy
IEP (or iep)	Isoelectric point
LLNL	Lawrence Livermore National Laboratory, U.S. DOE
LLW	Low level radioactive waste
MCL	Maximum Contaminant Level
MEPAS	Multimedia Environmental Pollutant Assessment System
MS-DOS®	Microsoft® disk operating system (Microsoft and MS-DOS are register trademarks of Microsoft Corporation.)
NPL	Superfund National Priorities List
NRC	U.S. Nuclear Regulatory Commission
NWWA	National Water Well Association
OERR	Office of Remedial and Emergency Response, U.S. EPA
ORIA	Office of Radiation and Indoor Air, U.S. EPA
OSWER	Office of Solid Waste and Emergency Response, U.S. EPA

PC	Personal computers operating under the MS-DOS® and Microsoft® Windows operating systems (Microsoft® Windows is a trademark of Microsoft Corporation.)
PNL	Pacific Northwest Laboratory. In 1995, DOE formally changed the name of the Pacific Northwest Laboratory to the Pacific Northwest National Laboratory.
PNNL	Pacific Northwest National Laboratory, U.S. DOE
PZC	Point of zero charge
RCRA	Resource Conservation and Recovery Act
SCM	Surface complexation model
SDMP	NRC's Site Decommissioning Management Plan
TDS	Total dissolved solids
TLM	Triple-layer adsorption model
UK	United Kingdom (UK)
UK DoE	United Kingdom Department of the Environment
UNSCEAR	United Nations Scientific Committee on the Effects of Atomic Radiation

## A.2.0 List of Symbols for the Elements and Corresponding Names

Symbol	Element	Symbol	Element	Symbol	Element
Ac	Actinium	Gd	Gadolinium	Po	Polonium
Ag	Silver	Ge	Germanium	Pr	Praseodymium
Al	Aluminum	H	Hydrogen	Pt	Platinum
Am	Americium	He	Helium	Pu	Plutonium
Ar	Argon	Hf	Hafnium	Ra	Radium
As	Arsenic	Hg	Mercury	Rb	Rubidium
At	Astatine	Ho	Holmium	Re	Rhenium
Au	Gold	I	Iodine	Rh	Rhodium
B	Boron	In	Indium	Rn	Radon
Ba	Barium	Ir	Iridium	Ru	Ruthenium
Be	Beryllium	K	Potassium	S	Sulfur
Bi	Bismuth	Kr	Krypton	Sb	Antimony
Bk	Berkelium	La	Lanthanum	Sc	Scandium
Br	Bromine	Li	Lithium	Se	Selenium
C	Carbon	Lu	Lutetium	Si	Silicon
Ca	Calcium	Lw	Lawrencium	Sm	Samarium
Cb	Columbium	Md	Mendelevium	Sn	Tin
Cd	Cadmium	Mg	Magnesium	Sr	Strontium
Ce	Cerium	Mn	Manganese	Ta	Tantalum
Cf	Californium	Mo	Molybdenum	Tb	Terbium
Cl	Chlorine	N	Nitrogen	Tc	Technetium
Cm	Curium	Na	Sodium	Te	Tellurium
Co	Cobalt	Nb	Niobium	Th	Thorium
Cr	Chromium	Nd	Neodymium	Ti	Titanium
Cs	Cesium	Ne	Neon	Tl	Thallium
Cu	Copper	Ni	Nickel	Tm	Thulium
Dy	Dysprosium	No	Nobelium	U	Uranium
Er	Erbium	Np	Neptunium	V	Vanadium
Es	Einsteinium	O	Oxygen	W	Tungsten
Eu	Europium	Os	Osmium	W	Wolfram
F	Fluorine	P	Phosphorus	Xe	Xenon
Fe	Iron	Pa	Protactinium	Y	Yttrium
Fm	Fermium	Pb	Lead	Yb	Ytterbium
Fr	Francium	Pd	Palladium	Zn	Zinc
Ga	Gallium	Pm	Promethium	Zr	Zirconium

### A.3.0 List of Symbols and Notation

$\rho_b$	Porous media bulk density (mass/length <sup>3</sup> )
$\text{\AA}$	Angstrom, $10^{-10}$ meters
ads	Adsorption or adsorbed
$A_i$	Concentration of adsorbate (or species) I on the solid phase at equilibrium
am	Amorphous
aq	Aqueous
CEC	Cation exchange capacity
Ci	Curie
d	Day
dpm	Disintegrations per minute
$e^-$	Free electron
Eh	Redox potential of an aqueous system relative to the standard hydrogen electrode
F	Faraday constant, 23,060.9 cal/V·mol
g	Gram
$^3\text{H}$	Tritium
h	Hour
I	Ionic strength
IAP	Ion activity product
IEP	Isoelectric point
$K_d$	Concentration-based partition (or distribution) coefficient
$K_{r,298}$	Equilibrium constant at 298 K
$K_{r,T}$	Equilibrium constant at temperature T
l	Liter
M	Molar
m	Meter
mCi	Millicurie, $10^{-3}$ Curies
meq	Milliequivalent
mi	Mile
ml	Milliliter
mol	Mole
mV	Millivolt
N	Constant in the Freundlich isotherm model
n	Total porosity
$n_e$	Effective porosity
pCi	Picocurie, $10^{-12}$ Curies
pE	Negative common logarithm of the free-electron activity
pH	Negative logarithm of the hydrogen ion activity
$pH_{zpc}$	pH for zero point of charge
ppm	Parts per million
R	Ideal gas constant, 1.9872 cal/mol·K

$R_f$	Retardation factor
s	Solid phase species
sec	Second
SI	Saturation index, as defined by $\log(IAP/K_{r,T})$
T	Absolute temperature, usually in Kelvin unless otherwise specified
t	Time
$t_{1/2}$	Half life
TDS	Total dissolved solids
TU	Tritium unit which is equivalent to 1 atom of $^3H$ (tritium) per $10^{18}$ atoms of $^1H$ (protium)
$v_c$	Velocity of contaminant through a control volume
$v_p$	Velocity of the water through a control volume
y	Year
Z	Valence state
z	Charge of ion
{ }	Activity
[ ]	Concentration